CLAIMS

What is claimed is:

1. A method for defect localization, comprising:

receiving a test structure that comprises at least one conductor and an electro-optically active material that is positioned such as to provide an indication about the electrical status of the at least one conductor;

applying an electrical signal to the conductor; and

imaging the test structure to locate a defect.

2. The method of claim 1, wherein the test structure is positioned on a wafer.

3. The method of claim 2, wherein the test structure is located on a scribe line or a die of the wafer.

4. The method of claim 1, wherein the step of imaging comprises illuminating the test structure with a polarized light.

5. The method of claim 1, further comprising reporting the location of the defect.

6. The method of claim 1, wherein the electro-optically active material is birefringent.

7. The method of claim 1, wherein the electro-optically active material is polymer.

8. The method of claim 1, wherein the electro-optically active layer is selected from the group consisting of: DAN [4- (N,N-dimethylamino)-3-acetamidomitrobenzene]; COANP [2-cyclo-octylamino -5- nitropyridine]; PAN [4-N-pyrrolydino -3- acetaminomitrobenzene]; and MBANP [2-(alpha-methylbenzylanino)-5-nitropyridine].

9. The method of claim 1, wherein the electro-optically active material is a liquid crystal.

10. The method of claim 1, wherein electro-optically active material is disposed by spin-on, PVD, CVD or ALD.

11. The method of claim 1, wherein the electro-optically active material is disposed such as to have a thickness that is substantially equal to a width of at least one conductor.

12. The method of claim 1, wherein the electrical signal is a direct current (DC) voltage or current.

13. The method of claim 1, wherein the amplitude of the electrical signal is about 5 volts.

14. The method of claim 1, wherein the electrical signal is an alternating voltage or current.

15. The method of claim 14, wherein the step of imaging comprises:

acquiring a first image of the test structure at a first phase of the electrical signal; and

acquiring a second image at a second phase of the electrical signal.

16. The method of claim 15, wherein the step of imaging further comprises processing the first and second image to determine the location of the defect.

17. The method of claim 16, wherein the processing comprises providing a difference image between the first and second images.

18. The method of claim 15, wherein the electrical signal alternates at a frequency that ranges between 1-100Hz.

19. The method of claim 1, wherein imaging the test structure further comprises imaging with sufficient resolution to detect defects comparable in size to a smallest dimension of a conductor of the test structure.

20. The method of claim 1, wherein imaging the test structure further comprises selecting resolution based on a dimension of at least one conductor.

21. The method of claim 1, wherein the test structure further comprises a non-opaque conductive material positioned above the electro-optically active material.

22. The method of claim 21, wherein the non-opaque conductive layer is electrically grounded.

23. The method of claim 1, wherein the step of receiving a test structure is preceded by the steps of: inspecting the test structure before the conductor is at least partially covered by an electro-optically active material; and analyzing the test structure to provide a first analysis result.

24. The method of claim 1, further comprising performing a probe-based analysis of the test structure.

25. The method of claim 1 wherein the electrical signal charges at least a portion of the conductor.

26. A system for defect localization, comprising:

means for providing an electrical signal to at least one conductor of a test structure; wherein the test structure comprises at least the conductor and electro-optically active material that is positioned such as to provide an indication about the electrical status of the at least one conductor;

means for illuminating the test structure;

at least one detector, for detecting light scattered or reflected from the test structure; and

a processor for processing detection signals from the detectors to locate a defect.

27. The system of claim 26, wherein the means for illuminating illuminates the test structure with a polarized light.

28. The system of claim 26, further adapted to report the location of the defect.

29. The system of claim 26, wherein the electrical signal is a direct current (DC) voltage or current.

30. The system of claim 26, wherein the amplitude of the electrical signal is about 5 volts.

31. The system of claim 26, wherein the electrical signal is an alternating voltage or current.

32. The system of claim 31, wherein the system is adapted to acquire a first image of the test structure at a first phase of the electrical signal; and acquire a second image at a second phase of the electrical signal.

33. The system of claim 32, wherein the processor is adapted to process the first and second image to determine the location of the defect.

34. The system of claim 33, wherein the processor is adapted to generate a difference image between the first and second images.

35. The system of claim 31, wherein the electrical signal alternates at a frequency that ranges between 1-100Hz.

36. The system of claim 26, wherein the system is adapted to image the test structure with sufficient resolution to detect defects comparable in size to a smallest dimension of a conductor of the test structure.

37. A test structure configured to facilitate the localization of defects therein, comprising:

at least one conductor configured to receive an electrical signal;

an electro-optically active layer positioned such as to provide an optical indication about the electrical state of the at least one conductor to facilitate defect localization.

38. The test structure of claim 37, wherein the electro-optically active material is birefringent.

39. The test structure of claim 37, wherein the electro-optically active material is polymer.

40. The test structure of claim 37, wherein the electro-optically active layer is selected from the group consisting of: DAN [4- (N,N-dimethylamino)-3-acetamidomitrobenzene]; COANP [2-cyclo-octylamino -5- nitropyridine]; PAN [4-N-pyrrolydino -3- acetaminomitrobenzene]; and MBANP [2-(alpha-methylbenzylanino)-5-nitropyridine].

41. The test structure of claim 37, wherein the electro-optically active material is a liquid crystal.

42. The test structure of claim 37, wherein the electro-optically active material at least partially covers the at least one conductor.

43. The test structure of claim 37, wherein the test structure further comprises a non-opaque conductive material positioned such as to enhance detected radiation from the test structure.

44. The test structure of claim 43, wherein the non-opaque conductive layer is electrically grounded.